Design Project: Workspace Organizers

ENGG 1111 Integrated Engineering

Requirements Brief

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Overview of Design Project

The team design project aims to create a product promoting the University of Sydney's STEM (Science, Technology, Engineering and Mathematics) faculties and is to be targeted at visitors and guests. The product is to be promoted through the item itself being on display or carried on the consumer.

The designing of the product will be carried out using software such as SolidWorks and exporting the file in CAD format for printing. The product itself is to be 3D printed using plastic material. Furthermore, the product must satisfy the requirements mentioned in sections below. A primary prototype is to be made modelling the future mass production of the item, if successful. In order to maximise sales, the item is to be sold at a lower price than other similar products on the market but still being profitable while accounting for manufacturing costs and profit margins.

1. The first stage of the design project is to decide upon a suitable project concept that satisfies the necessary requirements from the client.
2. The second stage involves generating a design using SolidWorks. The product is to be modelled within this software and files are to be submitted for printing in correct CAD format.
3. Finally, when the prototype is printed and passes inspection, testing and is functional (with no printing errors, etc.) the product is used for presentation to clients.

The product concept itself aims to address the need for STEM to be advertised within the University community and reach out to new attendees, students and perhaps staff. This will lead to awareness to the science, technology, engineering and mathematics faculties within the University of Sydney. Furthermore, the organisation in the workplace and at home.

Statement of the Problem

The primary objective of the design project is to create the product that will be used by the recipients and will be put on display, not thrown away allowing the product should increase the marketing impact. The major problem to be solved therefore, is designing and producing something that will sell and be utilized as well as being less expensive in comparison to other competitors. Furthermore, the problem to be solved is accounting for these various requirements and satisfying all mentioned factors, mentioned in this report, in the product being produced. The product itself is planned to organize a workspace and specifically solve the issue of having messy cables.

The design project contains the issue of generating a product concept or various concepts and ideas of items that would be a valid product for production and sales. Furthermore, the next stage of the design project is to solve the issue as to which product is the most suitable and satisfies all of the requirements. Upon printing it is important to account for various problems that may arise such as, the factor of gravity and how that could distort the model being printed, the layout and weight distribution of the layers being printed and printing of several components as well as considering how they are to be connected to print in one file and session.

The product is planned to be entirely analogue with potential mechanical and kinetic components with an appropriate considered flexibility to prevent snapping, breaking and distortions of the product material which may affect the functionality of the product.

Operational Description

The operation of the product is defined as the management of and the process of controlling and functioning of the product as well as how the function is to be carried out. The concepts primarily revolve around the student life of the consumer. Therefore, the product is to be functional without the use of electronic components or requirements.

The project concept displays a workplace organiser which sorts through cables and categorizes them for the consumer. Therefore, the organiser must be mountable and easy to do so. Remembering that portability is also a requirement, the mount maybe a table side clip. The device therefore, is operated by clipping the device onto the workspace desk and using it as an organizer of cables via a clipping system.

The product will be used to aid in work and studying to assist in promoting STEM and focus/relate to its purpose effectively. For example, it is appropriate to have an item that aids in aspects of technology as it is being produced for STEM. The product itself strives to be easily used, maintained and handled by anyone. The product is portable and compact allowing for it to be carried on the person, whether it be on the person themselves or in their backpack, as it is targeted at students and visitors at a time like orientation day.

Requirements & Test Plan:

Project Scenario Requirements:

- Aimed at the target market of university students and visitors. The age of the consumers should be assumed to be teenagers or young adults (18-25 years old).
- Must have a lower price than other similar products currently on the market.
- Additional features and functionalities over other similar products on the market.
- Printed product is less than or equal to seven centimetres wide, long and high (70mmx70mmx70mm).
- Can be identified to be a product from the University of Sydney and allows for advertising.
- Must sell at a price less than $20 AUD.
- Consumers would use and display to increase marketing impact.
- 80% of the volume of the product must be 3D printed with a time constraint of two hours for printing.
- Has a maximum of three individual components to be joined in some manner (printed together using connecting tabs).
- Total production cost must be less than selling price plus any margin needed to recover fixed costs and/or make a profit.
- 2000 sales must be made per year for the first two years.

Requirement	**Details (Why/How)**	**Judgement/ Evidence and Evaluation of Success**	**Success (Out of 5 Stars)**
Successfully Attracts and Satisfy the User's needs	Aimed at the target market of university students and visitors; assumed to the teenagers or young adults, typically 18 to 25 years old.	Conduct surveys from within the target market Should be rated 1-5, asking users upon the functionality, aesthetics, ergonomics, costs, social and obsolescence of the design.	
Financially Viable	Must have a lower cost than competing products on the market, in terms of manufacturing, materials and labor costs.	Finance report of costs provided, showing the prices of similar products compared to the final cost the design.	
	Users will buy the product at retail price at less than AUD$20	Conducted with the survey with the target market under costs	

Features and Functionality	Must meet user requirements with added benefits of new features and functions that may bring more sales.	Conducted with the survey with the target market under functionality, aesthetics, ergonomics.	
Minimised Obsolescence	Has the capacity to achieve 2000 sales per year prolonging within the market for up to 2 years.	Conducted with the survey with the target market under social and obsolescence of the design.	
	Consumers would use and display to increase marketing impact.		
Printing Requirements	Printed product is less than or equal to seven centimetres wide, long and high. (70mmx70mmx70mm +/- 1mm)	- Screenshots of software design with clear annotations of the dimensions. - Orthogonal and 3D sketches and photos of final design with clear dimensions stated.	
	Total production cost must be less than selling price plus any margin needed to recover fixed costs and/or make a profit.	Calculating the cost of production against the cost via methods of totaling and spreadsheets.	
	Has a maximum of three individual components to be joined in some manner (printed together using connecting tabs).	Checking that the design of the model is correctly connected with tabs designed appropriately.	
	80% of the volume of the product must be 3D printed with a time constraint of two hours for printing.	Estimating the 80% using volume calculations.	

Product Concept Requirements:

- Appropriateness of design.
- Ergonomics - Portable and easy to carry/display.
- Compact and not bulky.
- Aesthetically pleasing to users
- Functional and easy to use.
- Quality - durable from small incidents such as dropping the product from a height.
- Reliable and will not decay in quality over a short period of time.
- Maneuverability of the conjoined product - should the project have conjoined parts, the design needs to be soundless with a smooth transition throughout.

Environmental Considerations

Environmental Impacts

The product design can be discarded into the environment unsustainability by users. It can be thrown directly into the environment where it can enter into the grey-water systems to be collected into man-made dams, which can clog up waterways and disrupting water flow.
The design may also be set upon the australian land where it can be subjected to regular erosion and sun exposure, morphing the plastic to effect the surrounding wildlife, affecting the delicate australian ecosystem. The plastic product may be discarded within an urban environment where it can be dirtied and broken, posing as unaesthetically pleasing waste.

Social Impacts

A characteristic of successful products is the ability to have a functionality that addresses an issue faced by a large group of individuals, and in doing so, have potentially far-reaching social impacts. On a more specific level, the social impacts of this product may include vast implementation and use over the University. This can positively affect STEM by increasing awareness of its various faculties and influencing new students' decisions, thereby increasing the potential student base. Moreover, it will bring STEM to a positive light and ultimately increase the reputation and credibility of the degrees.

On a broader scale, the product may serve the dual purpose of not only promoting STEM at the university, but having a functionality that extends past the scope of the university and its students, and addressing a broader social purpose. The social impacts of the product may include assisting with the workflow and productivity of the community, or alternatively improving the ease of day-to-day tasks for consumers. Ultimately, whilst the product will be designed with a specific purpose in mind, the design process will involve a consideration of broader social issues and the ability of the product to address these.

Appendix

Concept Idea:

Workspace Cable Organizer.

Target Market:

Students, visitors of the university and young adults, workers and individuals using a computer or possess a office layout as their workspace.

Selling Price:

$10 AUD.

Product Evaluation Matrix	Fails to meet	Meets	Exceeds
Target market		**X**	
Price advantage over competitor's product		**X**	
Features and functionality advantage over competitor's product		**X**	
Recipients will use, are likely to put on display and/or carry with them to increase marketing impact		**X**	
Can the product be badged and/or identified to be from the University of Sydney		**X**	
Manufactured using UP Box 3D printer in 2 hours or less		**X**	
Printed product volume ≤70mm*70mm*70mm		**X**	

Three or less components joined with thin tabs enabling printing from one file		**X**	
Total production cost less than selling price plus any margin needed to recover fixed costs and/or make a profit		**X**	
Would sell at sale price less than $20 AUD		**X**	
Capacity to achieve 2000 sales per year for 2 years		**X**